

WHAT IS CLAIMED IS:

1. An image formation apparatus comprising, within an enclosure configured by a pair of substrates placed face
5 to face and an external frame placed between said substrates:

an electron source placed on one of said pair of substrates;

an image formation material placed on the other
10 substrate; and

spacers placed between said substrates,

wherein said spacers and said external frame are conductive, and means for electrically connecting said spacers and said external frame is provided so that the
15 equipotential surfaces between said spacers and said external frame are quasi-parallel when the apparatus is driven.

2. An image formation apparatus comprising, within an enclosure configured by a pair of substrates placed face
20 to face and an external frame placed between said substrates:

an electron source placed on one of said pair of substrates;

25 an image formation material placed on the other substrate; and

spacers placed between said substrates,

wherein said spacers and external frame are conductive,
a quasi-equal potential V1 is applied to the top end of said
spacers and the top end of said external frame when the
5 apparatus is driven and a quasi-equal potential V2, which
is different from the potential V1 is applied to the bottom
end of said spacers and the bottom end of said external
frame.

10 3. An electron beam source substrate comprising:

a plurality of electron emission devices matrix-wired
on a substrate with a plurality of row-direction wires and
a plurality of column-direction wires,

wherein each of said plurality of electron emission
15 devices is surrounded by the row-direction wires and the
column-direction wires, and the wiring width in a non-
crossing area of the row-direction wires and the
column-direction wires is wider than the wiring width in
a crossing area of the row-direction wires and the
20 column-direction wires.

4. An image formation apparatus comprising:

an electron source substrate equipped with a plurality
of electron emission devices matrix-wired on a substrate
25 with a plurality of row-direction wires and a plurality of
column-direction wires; and

an image formation material for forming images by radiation of electrons emitted from said plurality of electron emission devices,

wherein each of said plurality of electron emission
5 devices is surrounded by the row-direction wires and the column-direction wires, and the wiring width in a non-crossing area of the row-direction wires and the column-direction wires is wider than the wiring width in a crossing area of the row-direction wires and the
10 column-direction wires.

5. An image formation apparatus comprising:

a substrate on which are placed a plurality of wires connecting electron emission devices;

15 a substrate on which is placed an image formation material for forming images by radiation of electrons emitted from said electron emission devices;

spacers placed between said substrates; and
getters,

20 wherein said spacers are placed on the wires and the getters are placed on the wires without the spacers.

6. An image formation apparatus comprising:

a substrate on which are placed a plurality of wires
25 connecting electron emission devices;

a substrate on which is placed an image formation material for forming images by radiation of electrons emitted from said electron emission devices;

a plurality of spacers placed between the substrates;

5 and

getters,

wherein the plurality of spacers are placed on the wires and the getters are placed on the wires between the plurality of spacers.

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7. An image formation apparatus comprising:

a substrate on which are placed wires connecting electron emission devices;

15 a substrate on which is placed an image formation material for forming images by radiation of electrons emitted from the electron emission devices; and

spacers placed between said substrates,

20 wherein the wires have an arch-shaped cross section and the spacers are placed on the wires and the corner of the end face being contacted with the wire is rounded.

8. An image formation apparatus comprising:

a substrate on which wires connecting electron emission devices are disposed;

a substrate on which an image formation material for forming images by radiation of electrons emitted from the electron emission devices is disposed; and

spacers placed between said substrates,

5 wherein the image formation material has a non-light-emitting material with an arch-shaped cross section and the spacers are placed on the non-light-emitting material and the corner of the end face that has contact with the non-light-emitting material is rounded.

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9. An electron beam source substrate comprising:

a plurality of electron emission devices matrix-wired on a substrate with a plurality of row-direction wires and a plurality of column-direction wires,

15 wherein a potential specification section is provided in a non-crossing area of the row-direction wires and the column-direction wires.

10. The electron beam source substrate according to claim
20 9, wherein said potential specification section is connected to the wires.

11. The electron beam source substrate according to claim
25 9 or 10, wherein said potential specification section is an electrode for leading the wires.

12. The electron beam source substrate according to any one of claims 9 to 11, wherein the matrix wires are formed on a single substrate.

5 13. An image formation apparatus comprising:

an electron source substrate equipped with a plurality of electron emission devices matrix-wired on a substrate with a plurality of row-direction wires and a plurality of column-direction wires; and

10 an image formation material for forming images by radiation of electrons emitted from said plurality of electron emission devices,

wherein a potential specification section is provided in a non-crossing area of the row-direction wires and the
15 column-direction wires.

14. The image formation apparatus according to claim 13, wherein said potential specification section is connected to said wires.

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15. The image formation apparatus according to claim 13 or 14, wherein the potential specification section is an electrode for leading the wires.

16. The image formation apparatus according to any one of claims 13 to 15, wherein the matrix wires are formed on a single substrate.

5 17. An image formation apparatus comprising:

a first substrate on which an electron source is provided; and

a second substrate on which fluorescent materials are coated with metal backing and non-light-emitting material
10 facing the electron source,

wherein said fluorescent materials and the non-light-emitting material have a thickness different from each other, and means for applying a potential close to the potential applied, when the apparatus is driven, to the side
15 where the electron beam source is placed on said first substrate is provided on the side opposite to the side of said second substrate where the fluorescent materials and the non-light-emitting material are placed.

20 18. An image formation apparatus comprising:

an image formation substrate having a fluorescent material, a metal backing that covers said fluorescent material and a high-voltage leading terminal electrically connected to said metal backing, placed on a substrate,

wherein a belt-like interconnecting conductive film that connects between said metal backing and said high-voltage leading terminal is provided.

5 19. An image formation apparatus comprising:

an electron source substrate on which an electron source is provided; and

an image formation substrate placed opposite to said electron source substrate, on which fluorescent materials
10 are disposed, a metal backing that covers said fluorescent materials and a high-voltage leading terminal electrically connected to said metal backing,

wherein said image formation substrate is provided with a belt-like interconnecting conductive film that
15 connects between said metal backing and said high-voltage leading terminal.

20. An image formation apparatus comprising:

an enclosure containing an electron source substrate
20 on which an electron source is disposed, and an image formation substrate on which an image formation material for forming images by radiation of electrons emitted from the electron source is provided; and

a housing with a support section for said enclosure,
25 wherein said support section supports said electron source substrate without said image formation substrate.

21. The image formation apparatus according to claim 20,
wherein said support section supports a part where the
electron source substrate and said image formation
5 substrate do not overlap.

22. The image formation apparatus according to claim 20
or claim 21, wherein said support section supports the
electron source substrate together with a flexible section
10 placed on said electron source substrate.

23. An image formation apparatus comprising:

a substrate on which a plurality of wires connecting
electron emission devices are provided;

15 a substrate on which an image formation material for
forming images by radiation of electrons emitted from the
electron devices is provided; and

a plurality of spacers placed between said substrates,
wherein said plurality of spacers are placed on the
20 wires discretely so that the number of wires between said
spacers falls within the range of 5 to 50.

24. The image formation apparatus according to claim 23,
wherein an enclosure is configured by the substrates and
25 an external frame placed between said substrates, and the
ratio of internal area A of the enclosure on a cross section

horizontal to one of said substrates to total cross-sectional area S of said plurality of spacers, that is A/S , is within a range of 0.018% to 7.8%.

- 5 25. The image formation apparatus according to claim 23, wherein an enclosure is configured by said substrates and an external frame placed between said substrates, and the ratio of width W to thickness T of said external frame, that is, W/T , is within a range of 1.5 to 30.

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26. An image formation apparatus comprising, within an enclosure configured by a pair of substrates placed face to face and an external frame placed between said substrates:

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an electron source; and

an image formation material for forming images by radiation of electrons emitted from said electron source, wherein said external frame is formed by means of die punching.

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27. An image formation apparatus comprising, within an enclosure configured by a pair of substrates placed face to face and an external frame placed between said substrates:

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an electron source; and

an image formation material for forming images by
radiation of electrons emitted from said electron source,
wherein the corners of said external frame have an arc
shape inside and outside said enclosure and said arc shape
5 has different curvatures inside and outside said enclosure.

28. An electron beam source substrate comprising:

an electron emission devices;
wires connected to said electron emission devices; and
10 getters,

wherein said getters are placed on the wires and both
the getters and the wires have an arch-shaped cross-
section.

15 29. The electron beam source substrate according to claim
28, wherein the getters are non-evaporation type getters.

30. The electron beam source substrate according to claim
28 or 29, wherein the getters placed on the wires is narrower
20 than said wires.

31. An image formation apparatus comprising, within an
enclosure:

a substrate on which electron emission devices, wires
25 connected to the electron emission devices and getters are
provided; and

an image formation material for forming images by radiation of electrons emitted from the electron emission devices,

wherein the getters are placed on the wires and both
5 the getters and the wires have an arch-shaped cross-section.

32. The image formation apparatus according to claim 31,
wherein the getters are non-evaporation type getters.

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33. The image formation apparatus according to claim 31
or 32, wherein the getters placed on the wires is narrower
than said wires.

15 34. An image formation apparatus comprising:

a display panel; and

a high-voltage power supply connected to said display
panel,

wherein said high-voltage power supply is placed below
20 the center of gravity of said display panel.

35. The image formation apparatus according to claim 34,
wherein the high-voltage power supply is placed on the back
opposite to the display side of said display panel.

36. The image formation apparatus according to claim 34 or 35, wherein the display panel and the high-voltage power supply are placed with a distance in between.

5 37. An image formation apparatus comprising a first substrate on which fluorescent materials and black materials are disposed and a second substrate on which electron emission devices are provided, being placed face to face to the first substrate,

10 wherein the black materials are placed right above the electron emission section of the electron emission devices.

38. An electron beam source substrate comprising:

a. a substrate;

15 b. an array of electrode pairs on the substrate configured by pairs of device electrodes placed along a plurality of rows and a plurality of columns;

 c. a plurality of column wires on the substrate made up of column wires commonly connecting one of each electrode pair on the column provided for each electrode pair on each
20 column by means of screen printing;

 d. a plurality of row wires on a substrate made up of row wires insulated from said column wires, commonly connecting one of each electrode pair on the row provided
25 for each electrode pair on each row by means of screen printing;

e. a plurality of column terminal sections extended from the plurality of column wires and provided by screen printing; and

f. a plurality of row terminal sections extended from
5 the plurality of row wires and provided by means of screen printing.

39. The electron beam source substrate according to claim
39, wherein the electrode pairs are provided by offset
10 printing.

40. An image formation apparatus comprising:

a. an electron source substrate comprising a first
substrate, an array of electrode pairs on the first
15 substrate configured by pairs of device electrodes placed
along a plurality of rows and a plurality of columns, an
electron source placed between said pair of electrodes, a
plurality of column wires on the first substrate made up
of column wires commonly connecting one of each electrode
20 pair on the column provided for each electrode pair on each
column, and a plurality of row wires on the substrate
commonly connecting the other of each electrode pair on the
row, which are insulated from the column wires and wider
than said column wires, provided for each electrode pair
25 on each row;

b. an image formation substrate comprising a second substrate and an image formation material placed on the second substrate; and

c. spacers inserted between the electron source
5 substrate and said image formation substrate and placed on the row wires.

41. An image formation material comprising:

a. an electron source substrate comprising a first
10 substrate, an array of electrode pairs on the first substrate configured by pairs of device electrodes placed along a plurality of rows and a plurality of columns, an electron source placed between said pair of electrodes, a plurality of column wires on the first substrate made up
15 of column wires commonly connecting one of each electrode pair on the column provided for each electrode pair on each column, and a plurality of row wires on the first substrate commonly connecting the other of each electrode pair on the row, which are insulated from the column wires and wider
20 than the column wires, provided for each electrode pair on each row; and

b. an image formation material comprising a second substrate, an image formation material of a rectangular shape having a long side in the observation direction placed
25 on the second substrate along a plurality of rows and a plurality of columns and a lightproof material on the second

substrate that covers the space between said rows and between said columns,

wherein the image formation substrate has a distance between said plurality of adjacent rows wider than a
5 distance between said plurality of adjacent columns.

42. An image formation apparatus comprising:

a. an electron source substrate comprising a first substrate, an array of electrode pairs on the first
10 substrate configured by pairs of device electrodes placed along a plurality of rows and a plurality of columns, an electron source placed between said pair of electrodes, a plurality of column wires on the first substrate made up of column wires commonly connecting one of each electrode
15 pair on the column provided for each electrode pair on each column, and a plurality of row wires on the first substrate commonly connecting the other of each electrode pair on the row, which are insulated from said column wires, provided for each electrode pair on each row; and

20 b. an image formation substrate comprising a second substrate, an image formation material of a rectangular shape having a long side in the observation direction placed on the second substrate along a plurality of rows and a plurality of columns and a lightproof material on the second
25 substrate that covers the space between said plurality of

adjacent rows and the distance between said plurality of adjacent columns,

wherein said electron sources are placed face to face for each space between said plurality of columns.

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43. The image formation apparatus according to claim 42, wherein said image formation material is provided with a light-emitting material for each column for emitting light of a same color.

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44. The image formation apparatus according to claim 43, wherein said image formation material is provided with a light-emitting material for each column for emitting blue light, green light or red light.

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45. An image formation apparatus comprising:

a. an electron source substrate comprising a first substrate, an array of electrode pairs on the first substrate configured by pairs of device electrodes placed
20 along a plurality of rows and a plurality of columns, an electron source placed between said pair of electrodes, a plurality of column wires on the first substrate made up of column wires commonly connecting one of each electrode pair on the column provided for each electrode pair on each
25 column, and a plurality of row wires on the first substrate commonly connecting the other of each electrode pair on the

row, which are insulated from said column wires, provided for each electrode pair on each row; and

b. an image formation substrate comprising a second substrate, an image formation material of a rectangular shape having a long side in the observation direction placed
5 on the second substrate along a plurality of rows and a plurality of columns and a lightproof material on the second substrate that covers the space between said plurality of adjacent rows and the distance between said plurality of
10 adjacent columns; and

c. spacers inserted between said electron source substrate and said image formation substrate and placed on said row wires,

wherein said electron sources are placed face to face
15 for each space between said plurality of columns.

46. An image formation apparatus comprising:

image formation substrates placed face to face via spacers on an electron source substrate,

20 wherein said spacers are placed on wires connecting said electron sources, coated with a conducting film that is electrically connected to the wires, and the height of the top end of said conducting film is equal to or lower than the height at which in a potential distribution between
25 the potential while the electron source is emitting electrons and the acceleration potential given on said

image formation substrate side, the potential of the electron source is higher by 2 kV than said acceleration potential.